Effects of Different Salts and Concentrations on Germination and Growth of *Leymus chinensis*

L. H. Huang
Chinese Academy of Sciences, China

Z. W. Liang
Chinese Academy of Sciences, China

H. Y. Ma
Chinese Academy of Sciences, China

M. Liu
Chinese Academy of Sciences, China

C. Yan
Chinese Academy of Sciences, China

See next page for additional authors

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Presenter Information
L. H. Huang, Z. W. Liang, H. Y. Ma, M. Liu, C. Yan, and Z. C. Wang

Effects of different salts and concentrations on germination and growth of *Leymus chinensis*

L.H. Huang, Z.W. Liang, H.Y. Ma, M. Liu, C. Yan, Z.C. Wang*
*Northeast Institute of Geography and Agricultural Ecology, CAS, Changchun, Jilin 130012, China; Da'an Sodic Land Experiment Station of China, Da'an Jilin 131317, China; * E-mail: liangzw@neigae.ac.cn*

Key words: sodium salt, potassium salt, stress, germination, growth, *Leymus chinensis*

Introduction *Leymus chinensis* is one of good-quality and saline-alkali tolerant grasses in the northern area of China with economic and ecological significance. The high concentration of salt ions is the main factor inhibiting *L. chinensis* seed germination in the sodic soil in Songnen plain, while the level of inhibition depends upon the concentrations and kinds of salt. This study is to investigate the effect of sodium salts ($NaCl$, Na_2SO_4, $NaHCO_3$, Na_2CO_3) and potassium salts (KCl, K_2SO_4, $KHCO_3$, K_2CO_3) on germination of *L. chinensis*.

Materials and methods In this experiment, 0, 5, 10, 20, 50, and 100 mM $NaCl$, Na_2SO_4, $NaHCO_3$, Na_2CO_3, KCl, K_2SO_4, $KHCO_3$, K_2CO_3 were prepared and pH and electrical conductivity (EC) of solutions were determined. Seeds were placed on the plastic web floating upon 200 ml solution in a beaker and the solution was added every 2～3 d. The germination temperature was 16/28℃ with 12 h dark/12 h light photoperiod and the germination percentage of seeds, length of root and shoot were calculated and measured after 21 days.

Results In the eight salt solutions, pH of Na_2CO_3 and K_2CO_3 was the highest (10.5～11.5), followed by $NaHCO_3$ and $KHCO_3$ (8.0～8.5). pH of the other 4 salts was the lowest at 6.5～7.0. The EC showed upward trend with the increasing salt concentrations. Germination percentage and length of root and shoot of *L. chinensis* decreased as the salt concentrations increased (Table 1). The inhibition of carbonate and bicarbonate on seed germination was the greatest and no germination occurred in Na_2CO_3 or K_2CO_3 at 100 mM.

Table 1 *Effect of different concentrations of eight salts on seed germination and growth of* Leymus chinensis.

Salt kinds	*Salt concentrations (mM)*														
	5	10	20	50	100	5	10	20	50	100	5	10	20	50	100
	Germination percentage					*Root length*					*Shoot length*				
NaCl	↑	↑	↑	▽	▼	▽	▼	▼	▼	▼	↑	↑	↑	▼	▼
KCl	↑	↑	↑	▽	▼	▽	▼	▼	▼	▼	↑	↑	↑	▽	▼
Na_2SO_4	↑	▽	▽	▼	▼	▼	▼	▼	▼	▼	↑	▽	▼	▼	▼
K_2SO_4	↑	↑	▽	▽	▼	▼	▼	▼	▼	◎	↑	↑	▼	▼	▼
$NaHCO_3$	▽	▽	▼	▼	▼	↑	▼	▼	▼	◎	↑	↑	↑	▼	▼
$KHCO_3$	▽	▽	▽	▼	▼	▼	▼	▼	◎	◎	↑	↑	▼	▼	▼
Na_2CO_3	↑	▽	▼	▼	◎	▼	▼	◎	◎	◎	↑	▽	▼	▼	◎
K_2CO_3	↑	↑	▽	▼	◎	▼	▼	◎	◎	◎	↑	▼	▼	▼	◎

* ↑ Stimulate germination slightly; ▽ Inhibit germination slightly; ▼ Inhibit germination markedly; ◎ Inhibit germination absolutely.

Conclusion These results indicated that pH of Na_2CO_3 and K_2CO_3 was high, which inhibit the germination and growth of root and shoot of *L. chinensis* even at lower concentrations.

Acknowledgement This project is supported by the 973 program (2007CB106803), National Key Project for the Eleventh Five Year Plan (2006BAC01A08), and the Foundation of the Knowledge Innovation Project of Chinese Academy of Sciences (No. KZCX3-SW-NA3-05).